

Utah State University develops space wheat crop

The first crop developed specifically for growth in space has been developed at Utah State University.

A space-age wheat, USU-Apogee, produces the equivalent of almost 600 bushels of grain per acre—three times the top yields from most fields. It took more than a decade to develop a wheat suitable for space farms, where artificial sun always shines, carbon dioxide levels are high and space is a premium. Apogee thrives under those conditions. Its heads emerge 23 days after germination.

So far, Apogee's baking characteristics pass muster, at least on Earth. Making bread in space is still uncharted territory. On long-duration space missions, it will be more economical to provide life support supplies by producing food, such as Apogee, potable water and breathable air by recycling metabolic and other wastes. It's not known whether the new variety will make it to the moon or Mars, but it's likely to be grown on the International Space Station scheduled for completion in 2002.

"We're tickled to death with Apogee," said space scientist Doug Ming, of JSC Space and Life Sciences Directorate. "We're seeing much higher yields than the other varieties we've tried. It's also much shorter."

Bruce Bugbee, the USU crop physiologist who developed the variety, has worked with NASA for almost 15 years. He heads a NASA-supported university research facility to develop food crops for space in a complex consisting of 30 computer-controlled growth chambers of various sizes, in addition to several greenhouses.

Previously, the only wheat to be grown in space was Superdwarf, a short line that Bugbee originally found in Mexico. Apogee, which is the term for the point in orbit farthest from Earth, is a dwarf hard red spring wheat, developed from thousands of segregating lines. It produces few tillers, or branches, which tend to sap energy that a plant devotes to grain production.

"Superdwarf required perfect conditions for growth. Apogee doesn't," Ming said.

Earth Day celebration is Monday

"Support Your Local Planet" is the theme for this year's Earth Day celebration, set for 10 a.m.-2 p.m. Monday in Teague Auditorium.

"The celebration is JSC's way of participating in the worldwide Earth Day observance," said coordinator Jo Kines of the Plant Engineering Division's Environmental Services Office. "Earth Day is an annual opportunity for people around the world to explore our natural environment and to examine what can be done to protect and enhance it."

The JSC celebration will include 25-30 exhibits by local organizations and environmental agencies who will provide information on Earth friendly subjects. There will be contests, door prizes and an astronaut signing session from 11 a.m.-12:30 p.m.

In addition to the exhibits, four short workshops have been scheduled by local area experts, each lasting from 30-60 minutes. At 10 a.m., "Birding in the Houston Galveston Area" will be the featured topic. At 11 a.m. the focus will be "Environmentally Designed Homes for Southern Climates." At noon "Organic Gardening and Landscaping," will be the topic of discussion and at 1 p.m. "Native Plants of the Houston Galveston Area," will be discussed. The workshops will be held in Rm. 122 of Teague.

"That first Earth Day helped create the modern environmental movement, as well as the first environmental legislation—the Clean Air and Clean Water Acts," Kines said.

Kines said JSC is committed to supporting environmental protection and is pleased to provide this opportunity to enhance environmental awareness. For more information about Earth Day activities, call Kines at x33218.



Stacey Morrison, center, and Stephen Fredrickson question a student in the junior category about his project during the 37th annual Science Fair of Houston. More than 1,350 projects were entered into the fair this year.

JSC volunteers help judge Houston Science Fair entries

Fourteen JSC employees took time out last month to judge science projects at the 37th annual Science Fair of Houston.

The Space and Life Sciences Directorate awarded two internships and JSC employees handed out 12 Public Affairs Education Awards to students in junior, ninth and senior classes competing in chemistry, computers, Earth and space science, engineering, mathematics and physics.

"It was very interesting and there were many very good projects," said Mike Powell, who along with fellow Space and Life Science co-worker Gerald Taylor awarded two Life Science internship at the fair. "There were some individuals that were repeat winners that indicate there are some very talented young people in our area. I was quite impressed by them."

The Public Affairs Office Education award judges included Stacey Morrison of the Legal Office, Jim Poindexter of Public Affairs; Todd Gaspard of Flight Crew Operations; Cathy Kramer, Stephen Fredrickson and James Carpenter of the Engineering Directorate; Todd May of the Space Station Project Office; John Jackson and Lynn Bachemeyer of Space and Life Sciences; and Bob Herman of Hamilton Standard. Awards were chosen in more than 1,350 projects entered this year.

The fair is devoted to the enhancement of math and science education in junior and senior high schools. More than 90 businesses including JSC presented awards to students while top winners received scholarships and a chance to compete at the International Science and Engineering Fair.

JSC Legal office to host employee briefings soon

The Legal Office will host briefings on April 29 to explain changes in the law regarding employee participation in political activities.

Briefings that focus on the 1993 Reform Amendments to the Hatch Act will be held from 11 a.m.-noon and 1-2 p.m. April 29 in the Bldg. 30 auditorium.

"In this political election year, we would like to have the opportunity to explain the very broad changes to the civil service workforce," said Dan Remington, assistant chief council for general legal matters. "Those amendments relaxed prior restrictions on most JSC employees regarding active participation in partisan political activities."

The Hatch Act was originally passed in 1939 and determined that partisan political activity by federal employees must be limited for public institutions to function fairly and effectively, Remington said. The law prohibited direct action to assist partisan candidates or political parties in

campaigns, and prohibited soliciting or collecting political contributions, distributing campaign materials, selling fund-raising dinner tickets or otherwise promoting activities such as political dinners, he added.

On Oct. 6, 1993, President Clinton signed the Hatch Act Reform Amendments of 1993. The amendments became effective on Feb. 3, 1994, and the Office of Personnel Management subsequently published regulations in September 1994. Although the prohibitions expressed in the original law are still applicable to career senior executive service employees, most all of the previous restrictions, except those relating to political fund raising and partisan activities in the federal workplace or on official duty, have been removed, Remington said.

In addition, employees who have not fulfilled their ethics training requirement for this year may do so by attending this briefing. For details call the Legal Office at x31004.

Novation merges shuttle work

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and, above all, safe."

The eventual consolidation of NASA's Space Flight Operations under a single contract is expected to reduce shuttle costs by streamlining contractor operations and eliminating duplicative work while maintaining flight safety as the ultimate priority. NASA's involvement in the day-to-day operations of the space shuttle program also is expected to decrease as greater accountability is shifted to the contractor.

The two novation agreements signed last Friday, one covering

the space operations contract, NAS9-18000, with Rockwell Space Operations Co., and another covering the shuttle processing contract, NAS10-10900, with Lockheed Space Operations Co., will eventually consolidate all work from the two largest shuttle operations contracts with USA. However, in the near future, no terms or conditions of the two contracts will change and USA will immediately subcontract the same work to RSOC and LSOC that they had previously performed under their respective contracts with NASA.

'Take Our Children to Work Day' program changes location

The April 25 "Take Our Children to Work Day" program has changed locations and expanded to include a lunch special in the JSC Cafeterias.

The program, set to begin at 8:30 a.m., will now be presented in Teague Auditorium. Invited speakers including scientists, engineers and NASA astronauts will provide an inside look at the professional opportunities in a wide range of disciplines in the space program. The presentations will conclude at 10:30 a.m. and each child may then spend the remainder of the day observing and sharing in his/her sponsor's normal business activities.

The JSC Cafeterias also will offer a special lunch for children that will include a hamburger, fries and a drink for \$1.65.

Any employee may bring a maximum of one child between the ages of 9 and 15 to Teague at 8 a.m. The children do not have to be badged individually, but need to be escorted at all times by his/her badged sponsors. Employees may register for the lunch special, request an interpreter or sponsor a child by filling out a form available in the EOPO or through their directorate's administrative officer. For more information call Lupita Armendariz at x30604.

Mir 21 crew talks with Russian students

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English." The crew also said it was preparing for the arrival of the new-science module Priroda scheduled for launch later this month.

Last Tuesday, the crew answered questions from high school students at the Ulyanovsk school located about 200 miles outside of Moscow, taking part in the Fourth Aerospace Festival. Questions to all crewmembers on Mir ranged from where the station was currently located, to whether the two cosmonaut crew members were planning to vote in

the June presidential election. The cosmonauts said they planned to vote absentee, but hadn't decided for which candidate they would vote.

The crew's work schedule is laid out in the form of a cyclogram, which is similar to a shuttle flight plan. The cyclogram is generated four days ahead with real-time modifications and inputs sent to the crew via radio-grams or messages. A group of experts from NASA is serving as consultants to the Russian flight control team for scheduling and is on duty in the Mission Control Center in

Kaliningrad, throughout the crew's work day. Mir's final science module, Priroda or 'Nature,' is ready for launch from the Baikonur Cosmodrome complex. The shroud and nosecone were installed two weeks ago and the final management meeting—the Russian version of the flight readiness review—was conducted Monday. The module was transferred to the launch processing facility for integration into its Proton rocket on Tuesday. Priroda will be used to study the Earth for ecological and environmental purposes.

NASA Road 1 construction near JSC to be done during weekends

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Center Operations Director Jim Hickmon assisted with the effort and hailed this project as the first step for greater mobility for both JSC and the Clear Lake area.

"This project has been in the planning stages for over 20 years" Hickmon said. "Not only will it give center employees and contractors better access, it will increase area mobility and be a real boon to the Clear Lake economy. We know there will be some inconvenience as construction moves across the front of the center, but we are very pleased with the cooperation we have received from TXDOT officials to minimize impact on both the center and employees."

"There are two intersections that

are critical to the movement of traffic to and from the center," said Don Holick, Architect/Master Planner of JSC's Facility Development Division. "The Third Street and the Saturn Lane intersections with NASA Road 1 carry over 50 percent of our traffic volume. TXDOT proposed that work on these intersections be done on evenings and weekends when routine JSC traffic is lightest. Additionally, TXDOT is using a special concrete mix at these intersections that allows traffic to use the roadway within 24 hours after pouring. The net result is that an intersection will be torn up on Friday evening and be reopened to traffic on Monday morning."

"We had full input with the

TXDOT project engineers in their development of a construction phasing plan," Holick added. "They share our concern for movement of traffic to and from the center and along NASA Road 1 during this lengthy construction process and TXDOT engineers have gone the extra mile to minimize inconvenience to Center employees."

Phase 2 of the NASA Road 1 project, which includes a six-lane undivided roadway with continuous center left turn, extends from Clear Lake Park eastward to Highway 146 in Seabrook. This phase, which has been delayed for about a year to preserve wetlands at three bridge crossings, is now scheduled to start in early 1997

and be completed in late 1999.

Phase 3, forecast to begin in 1999, includes construction of a new roadway from the Cow Bayou bridges at Nassau Bay to Interstate Highway 45. This portion of the project will be a limited-access, six-and-eight-lane divided roadway with overpasses at El Camino Real, Highway 3, and I-45. The new road will split from the existing NASA Road 1 at the Star Car Wash west of El Camino Real and move south through the Houston Lighting & Power Webster Generating Station tract and the Exxon tank farm, bypassing the eastern edge of the city of Webster as it reaches a new interchange with I-45. A subsequent project eventually will link this inter-

change to FM 528 near the entrance to Challenger Park.

The entire project is expected to cost about \$90 million, and is a federally funded project with matching state and local funds.

The Phase 1 contract was awarded to J. D. Abrams, Inc. of Austin. The construction, slated for a 30 month period, will work westward from the Clear Lake Park toward El Camino Real. The north half of the new concrete roadway will be constructed first and then the south lanes will be constructed, thereby minimizing inconvenience to traffic moving through the area. TXDOT has pledged to maintain at least four lanes open at all times during construction.